

fasten it. Mr. Darwin⁸ has observed that absence of hair on the tongues of Lepidoptera and on the faces of Hymenoptera has led to the more usual adaptations, and sparseness of hair has its influence in this case. Species of *Augochlora* are the only insects on which I found pollinia. These bees are very smooth, depending for ornament on the metallic sheen of their bodies. An *Halictus* repeatedly pulled down the labella of flowers from which pollinia had not been removed; and the only reason I can assign for its failure to extract pollinia is that it is more hairy than the *Augochloras*.

I watched the flowers on five mornings between February 21 and March 4, and caught the following insects (Mr. E. T. Cresson kindly determined the *Bombus* and species of *Augochlora*):

Apidae: (1) *Bombus separatus* Cress⁹, bending lip but not removing pollinia; *Andrenidae*: (2) *Halictus*, do.; (3) *Halictus*, not bending lip; (4) *Halictus*, do.; (5) *Augochlora festiva* Sm., do.; (6) *Augochlora sumptuosa* Sm., with pollinia on first abdominal segment; (7) *Augochlora n. sp.* do.; *Vespidæ*: (8) *Odynerus histrio* St. Farg., bending lip, no pollinia; *Syrphidæ*: (9) *Mesograpta marginata* Say, not bending lip, determined by Dr. S. W. Williston; *Papilionidæ*: (10) *Papilio Philenor* Linn., not lighting; *Hesperidæ*: (11) *Pamphila*, the only insect lighting on column.

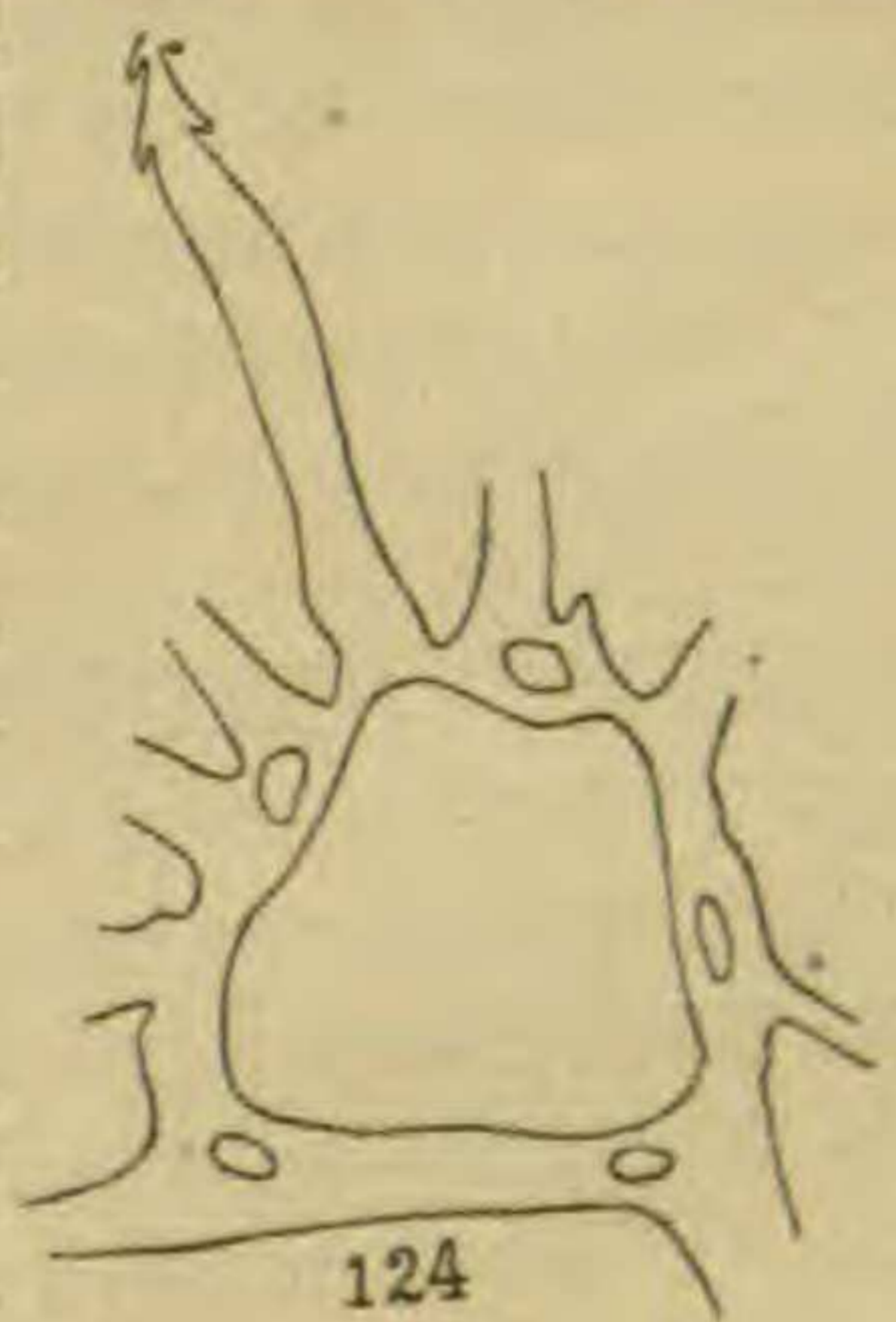
Notes on Umbelliferae of E. United States. VIII.

JOHN M. COULTER AND J. N. ROSE.

(WITH PLATE XVII.)

DISCOUPLEURA DC. Fruit ovate, flattened laterally; carpel with 5 primary ribs subtended by strengthening cells; dorsal and intermediates prominent and rather acute; laterals broad and united with a thickened corky margin: oil-ducts solitary in the intervals, two on the commissural side: seed-section roundish (figs. 107, 108).—Smooth branching annuals, with finely dissected leaves (filiform divisions), and white flowers. Fl. June to October.

1. ***D. capillacea* DC.** Mem. Umbel. 38. t. 8. Umbels 5 to 20-rayed; involucreal leaves (filiform) usually cleft or parted;



⁸ Loc. cit. 72.

⁹ All of the bees are females.

* Section of carpel of *Eryngium diffusum* X 40.

involucels more or less prominent.—Wet ground, Massachusetts to Florida, and westward to the plains. Runs through many intermediate forms into the

Var. *Nuttallii*, with umbels 15 to 30-rayed, involucral leaves usually entire, and involucels minute (*D. Nuttallii* DC.).—In the lower Mississippi Valley.

Although var. *Nuttallii* is set apart as a variety, it must be understood to include only extreme forms. There are many forms which intermediate and combine the characters of the species and variety. The number of rays is very inconstant, while the involucral leaves are frequently cleft and entire in different umbels on the same plant, and the involucels may be as prominent in forms which are var. *Nuttallii* in every other respect, as in true *D. capillacea*, or they may be very minute in the species itself. Fruit characters entirely fail to give any distinction. As for the form called *D. capillacea*, var. *costata* DC., we are at a loss to discover even any varietal characters. In a large series of specimens so labeled from different herbaria we fail to find the slightest distinction from *D. capillacea*; and if there is a var. *costata* we have never seen it, nor is it known to our best collectors.

The two following genera have been referred to *Apium* L.: *Leptocaulis* by Benthams and Hooker, and *Anmoselinum* by Gray. The general habit of the plants and the size of the fruit may indicate some such common relationship, but a study of their fruit structure reveals differences fully as great as obtain among other genera of Umbelliferae as at present considered. In fact, a glance at the figures representing these two genera and *Apium* on plate xvii will show a diversity of fruit characters greater than exists among any other three allied genera we have figured. Including these three genera under one would be entirely inconsistent with the definition of other genera of Umbelliferae. We therefore restore the genera as follows:

LEPTOCAULIS Nutt.—Fruit ovate, flattened laterally, bristly or tuberculate: carpel with 5 primary ribs somewhat prominent or obsolete, each subtended by a prominent group of strengthening cells (except in *L. patens*): oil-ducts solitary in the intervals (except occasionally in *L. patens*), two on the commissural side: seed-section dorsally flattened, with face more or less concave: stylopodium conical (figs. 109–114).—Very slender smooth branching annuals, with

finely dissected leaves (filiform or linear segments), and white flowers.

1. *L. echinatus* Nutt. DC. Prodr. 4. 107. A span to a foot high: fruit about half line long, echinate with spreading hooked bristles; ribs obsolete and seed-face slightly concave (figs. 109, 110). *Apium echinatum* Benth. & Hook.—Alabama to Arkansas and westward.

2. *L. divaricatus* DC. Mem. Umbel. 39. t. 10. One to two feet high, with spreading branches: umbels more diffuse than in the last, and usually with fewer rays: fruit half a line long, tuberculate; ribs somewhat prominent and seed-face slightly concave (figs. 111, 112). *Apium divaricatum* Benth. & Hook.—North Carolina to Florida and westward to Texas.

3. *L. patens* Nutt. DC. Prodr. 4. 107. One to two feet high, branching above: fruit half a line long, tuberculate; ribs obsolete and seed-face decidedly concave; pericarp thinner than in the preceding species and without strengthening cells; oil-ducts in the intervals often accompanied by smaller accessory ones (figs. 113, 114). *Apium patens* Watson, Bibl. Index, Polypet. 413.—From Missouri to Louisiana and Texas. This species, while undoubtedly most closely related to *Leptocaulis*, is exceptional in certain important characters. The thinner pericarp, the entire absence of strengthening cells, the frequent increase in the number of oil-ducts, and the almost sulcate seed-face are all characters that do not belong to *Leptocaulis*. While, therefore, we include it under this genus, it must be considered as an outlying member.

AMMOSELINUM Torr. & Gray.—Fruit ovate, flattened laterally: carpel with 5 prominent equal more or less scabrous ribs, the laterals closely contiguous to those of the other carpel, forming apparently a single rib: pericarp exceedingly hard, composed almost entirely of strengthening cells: oil-ducts solitary in the intervals, two on the commissural side, rather small and not close to seed cavity: seed-section dorsally flattened, with face slightly concave: stylopodium conical, with very short style (figs. 115, 116).—Low diffuse annual, with ternately divided leaves, the small ultimate segments linear to spatulate, and white flowers in small sessile or short-pedunculate unequal-rayed umbels.—This is one of the best marked genera of Umbelliferae. Its affinities are doubtful, but it holds no relation whatever to *Chærophyllum*, as was surmised in the original description, followed by Bentham and Hooker.

1. **A. Popei** Torr. & Gray, Pacif. R. Rep. 2. 165. About a span high, angles, midribs, rays, pedicels, and ribs of fruit rough scabrous: leaf-segments narrowly linear: fruit ovate-oblong, 2 to $2\frac{1}{2}$ lines long, with thick corky commissure. *Apium Popei* Gray.—Texas (*Wright, Parry, Reverchon*). Fl. April, May.

2. **A. Butleri**. Smaller, nearly glabrous: leaf-segments narrowly oblong or spatulate: fruit ovate, about a line long, with ribs smooth or minutely scabrous, and corky commissure much less prominent (figs. 115, 116). *Apium Butleri* Eng. Proc. Am. Acad. xxi. 453.—Texas (*Hall, Reverchon, Joor*); Indian Territory (*Butler*). Fl. March, April. Distributed in various collections as *Apium Popei*.

APIUM Linn.—Fruit ovate or broader than long, flattened laterally: carpel with 5 prominent obtuse corky nearly equal ribs: pericarp with no strengthening cells: oil-ducts solitary in the narrow intervals, two on the commissural side: seed-section round: stylopodium depressed or wanting (figs. 117, 118).—Erect or prostrate herbs, with pinnately or ternately divided leaves, umbels opposite the leaves, and white flowers.

1. **A. leptophyllum** F. Muel., Benth. Fl. Austral. 3. 372. A few inches to two feet high: leaves ternately divided into filiform segments: umbels sessile or short-pedunculate: fruit a line long. *Helosciadium leptophyllum* DC.—Florida to Texas and westward. March to June.

A. nodiflorum Benth. & Hook. (*Helosciadium nodiflorum* Koch), an introduced species, reported first by Walter around Charleston, S. C., and not afterwards found, has been recently collected by Dr. J. H. Mellichamp. It is also found on the ballast grounds near Philadelphia by I. C. Martindale.

BIFORA Hoffm.—Fruit broader than long, flattened laterally, the two globose carpels connected only by a narrow commissure: carpel with primary ribs obsolete, and 4 filiform secondary ribs: pericarp thin and very hard, made up almost entirely of strengthening cells: oil-ducts none: seed-face deeply concave: stylopodium conical: styles recurved over the carpels (figs. 119, 120).—Slender smooth annuals, with pinnately dissected leaves (segments filiform), and white flowers in few-rayed umbels.

1. **B. Americana** Benth. & Hook. Gen. Pl. 1. 926. A foot or more high, branching above, rays and angles of stem (es-

pecially summit of internodes) roughened with minute callous points: fruit $1\frac{1}{2}$ lines long, $2\frac{1}{2}$ lines broad. *Atrema Americana* DC.—Missouri (*Tracy*), Arkansas and Texas.

ERYNGIUM Linn —Fruit ovate or obovate, flattened laterally, scaly, tuberculate or bristly: carpel with ribs obsolete (in ours): pericarp without strengthening cells: oil-ducts solitary beneath the ribs (or their normal position), two on the commissural side (making 5 in all): seed-face plane: styles filiform (figs. 121-124). —Herbs with spiny or prickly mostly lobed or toothed leaves, and bracted flowers closely sessile in dense heads.—A large genus, with about 20 North American species, chiefly southern. The genus is so well defined by its general habit, and mature fruit is so completely lacking in our herbaria, that in the present series of papers we will not undertake to define the species. We would urge upon collectors the necessity of securing good fruiting specimens of all our *Eryngiums*, as in the few species studied there is indicated a wide range of fruit structure.

With this paper is concluded the presentation of our 80 species of Umbelliferæ east of the 100th meridian. It is to be hoped that the characters presented will be subjected to a thorough test by collectors and herbarium workers, that in the final elaboration of the North American representatives of the family the most permanent possible results may be obtained. At the same time we would ask for additional material from all quarters, especially fruiting specimens. We are under great obligations to many botanists, to whom we have already, in earlier papers, given our grateful acknowledgments.

EXPLANATION OF PLATE XVII.—Fig. 107, fruit of *Discopleura capillacea*; fig. 108, section of carpel of same; fig. 109, fruit of *Leptocaulis echinatus*; fig. 110, section of carpel of same; fig. 111, fruit of *L. divaricatus*; fig. 112, section of carpel of same; fig. 113, fruit of *L. patens*; fig. 114, section of carpel of same; fig. 115, fruit of *Ammoselinum Butleri*; fig. 116, section of carpel of same; fig. 117, fruit of *Apium leptophyllum*; fig. 118, section of carpel of same; fig. 119, fruit of *Bifora Americana*; fig. 120, section of carpel of same; fig. 121, fruit of *Eryngium aromaticum*; fig. 122, section of carpel of same; fig. 123, fruit of *E. diffusum*. Fig. 119 is $\times 5$; fig. 107 is $\times 7$; figs. 109, 111, 113, 115, 117, 120, 121, 123, are $\times 22$; figs. 108, 110, 112, 114, 116, 118, 122, are $\times 40$.